BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Biomedical Science Pearson BTEC International Level 3 Diploma in Environmental Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science Pearson BTEC International Level 3 Extended Diploma in Environmental Science
Unit number and title	**Unit 16: Applications of Inorganic Chemistry**
Learning aim(s)	**A:** Understand the chemistry of inorganic compounds and patterns of chemical reactivity in the Periodic Table
Assignment title	**Inorganic compounds and patterns of chemical reactivity in the Periodic Table**
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are a laboratory technician working for a chemical company that specializes in making inorganic compounds. In your role you need to understand the way inorganic compounds are used in many industries and service sciences. Examples of their uses include the treatment of soil, as fertilisers and in the treatment of water and effluent. They are also used as pigments in paints and as catalysts to enhance the rate of many reactions. They also have roles in photosynthesis and in the medical field such as dentistry, and cancer treatment. Your supervisor has set up some Continuing Professional Development (CPD) for you to ensure that you have a good understanding of the applications of inorganic compounds, their acid-base properties and characteristics of transition metal compounds and complexes.

Task	As part of your annual CPD in your role of laboratory technician you are required to **investigate** and **analyse** the reactions of transition metal complexes and the acid-base nature of inorganic compounds in Period 3. Your supervisor has also asked you to prepare a report that **explains** the key features of and applications of transition metal compounds and **reviews** the applications of inorganic acids and bases. Your final portfolio must contain the following five sections: Section 1 – Key features of transition metal compounds • **Explain** the four key features of transition metal compounds (redox, catalysis, colour, and formation of complex ions). Refer to the electronic configuration of the transition metals and their ions. Use appropriate

equations or diagrams to illustrate your explanation. Select an example of transition metal compounds or complexes for each key feature to explain how the property has an application.

Section 2 – The applications of inorganic acids and bases

- **Review** an example of each if the following types of applications of inorganic acids and bases to explain their acid or base properties (six examples in total). You must include equations in your explanations, and you should focus upon acids, bases and alkalis of Period 2 and 3 elements. For example, common acids such as hydrochloric acid, nitric(V) acid, sulfuric(VI) acid, phosphoric(V) acid and carbonic acid, and common bases such as sodium hydroxide, ammonia, calcium oxide and hydroxide, magnesium oxide and hydroxide.
    - treatment of acidic effluent, soil and indigestion
    - removal of transition metal ions from wastewater
    - manufacture of fertilisers
    - hydrolysis of fat, protein and polymers
    - extraction of alumina and neutralisation of impurities in steel manufacture
    - analytical applications (e.g. determining acid content in food and drink).

Section 3 - **Investigate** the reactions of transition metals

Investigate the reactions of transition metal complexes using five selected aqueous transition metal ion solutions. Types of reactions of transition metal ions are:

- deprotonation of the aqua complex ions with sodium hydroxide and ammonia solution
- acidity of aqua complex ions, testing with sodium carbonate
- ligand substitution
- redox reactions, in air and with reducing agents (e.g. iodide)

Make accurate observations of your investigations and record your results in suitable tables you have designed. Your observations need to include colour changes, precipitation, dissolving and effervescence.

Section 4 - **Investigate** the water solubility and acid-base properties of Period 3 oxides, hydroxides and chlorides

- **Investigate** the water solubility and acid-base properties of Period 3

	oxides, hydroxides and chlorides**.** Provide experimental results to include observations of their solubility and pH measurements for solutions formed for oxides and chlorides of s block elements and for at least two p block elements. Section 5 – The **analysis** of investigations of period 3 compounds and transition metal compounds • **Analyse** the investigations you have carried out on Period 3 oxides, chlorides and hydroxides and also the five selected transition metal aqueous complex ions. You should identify the type of bonding and structure in the Period 3 compounds and explain how this affects the solubility in water and acid-base nature. Use accurate terminology in explanations and correct notation in equations throughout to explain the results of your investigations.
Checklist of evidence required	A detailed report that includes: • A review of acid or base properties of a wide range of applications inorganic compounds • An explanation of the key features of transition metal compounds • An investigation into the water solubility and acid-base properties of Period 3 oxides, hydroxides and chlorides • An investigation into the reactions of transition metal complexes • An analysis of the investigations you have carried out on Period 3 oxides, chlorides and hydroxides

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria, you must show that you are able to:
A.D1	Analyse the reactions of Period 3 inorganic compounds and transition metal complexes
A.M2	Investigate the reactions of transition metal complexes
A.M1	Investigate the acid-base nature of inorganic compounds across period 3
A.P2	Explain the key features and applications of transition metal compounds

A.P1	Review the applications of inorganic acids and bases
Sources of information to support you with this Assignment	All sources of information suggested are UK based. Centres are free to amend these sources to those available in the Country of delivery where more appropriate. www.STEM.org.uk – Inorganic chemistry and the periodic table Structure and behaviour of inorganic compounds, Properties of transition metals and their compounds www.edu.rsc.org - Trends in the periodic table starters Trends in reactivity in the periodic table Within the copyright laws learners could search YouTube for – Transition metal complexes
Notes to the Assessor and technician	The practical activities suggested for this assignment are required to be safety checked by the Centre before use. Pearson Education can take no responsibility for the safety of any practical activities. Before doing any practical activity, you should always carry out your own risk assessment and refer to the necessary regulations. In particular, any local rules issued by your employer must be obeyed, regardless of what is suggested here. Centre should use Health and Safety information provided by a reputable source. In the UK such an example organization is CLEAPSS http://science.cleapss.org.uk/